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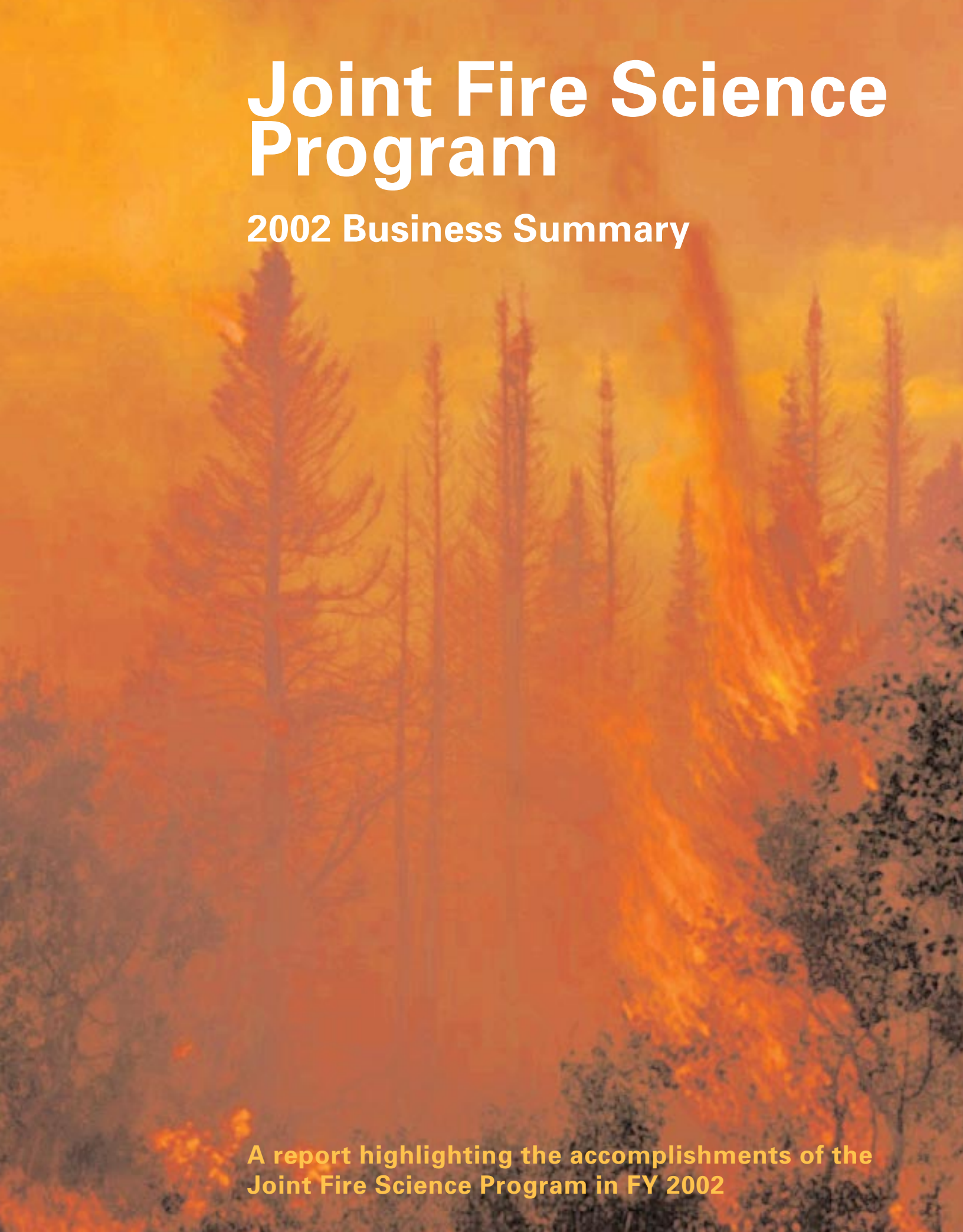
Joint Fire Science Program



Joint Fire Science Program

2002 Business Summary

A report highlighting the accomplishments of the Joint Fire Science Program in FY 2002

Appendices

2002, JFSP

Funded 53 new research projects,

Co-sponsored 3 wildland fire workshops

172 published papers

170 field trips with managers

Participated in 186 workshops or symposia

164 training sessions

Developed 30 web pages

48 compact disks [& other technology transfer media]

The Joint Fire Science Program (JFSP) was established in FY 1998 to provide scientific information and tools in support of fuel and fire management programs. The program funded 23 new research projects during its inaugural year. This is the third annual report of the Joint Fire Science Program. Since then, 155 additional projects have been funded, and results from these projects are being made available to agency field offices and other users. All JFSP projects require scientist-manager partnerships along with a strong emphasis on technology transfer. These partnerships are helping ensure that urgent research needs at the field level are being met. Further, close collaboration among the JFSP Governing Board, National Fire Plan research coordinators, the U.S. Geological Survey, and other research organizations and scientists helping to provide compatible and mutually beneficial products with optimal efficiency and minimal redundancy. In FY 2002, the JFSP funded 53 new research projects, co-sponsored 3 wildland fire workshops, began development of an administrative database, expanded 2 previous projects, and provided third-year funding for the 5-year "Fire and Fire Surrogates" project. Information on JFSP products included 172 published papers, 170 field trips with managers, 186 workshops or symposia, 164 training sessions, 30 Web pages for posting current and relevant project information, and 48 compact disks or other technology transfer media.

Figures provided by the National Interagency Fire Center in Boise, Idaho, indicate that approximately 3,000 structures were damaged or destroyed in nearly 67,000 fires during the 2002 fire season. These fires burned nearly 6.6 million acres—twice the 10-year average. This extraordinary fire year followed the 2000 fire season when 7.4 million acres burned and the 1999 fire season when 5.7million acres burned. These figures suggest that, although the number of fires remains approximately constant, the acreage burned has been double the 10-year average in 3 of the past 4 years. In addition, the current 10-year average is higher than in previous 10-year periods; it is clear that a trend toward increasingly larger burned area has developed, although its causes are under debate. While widespread drought likely contributed to the 2002 fires, drought was relatively less widespread and intense during the previous two large acreage years. It is becoming increasingly apparent that the high volume of fuel in many short fire return interval ecosystems, when combined with normal or extreme summer droughts, is a critical factor in the spread of wildland fires and their resistance to control. The National Fire Plan (NFP) has provided impetus and funding to accelerate treatments for reducing fuels both in wildland areas and in the wildland-urban interface. In trying to meet NFP goals and integrate them into larger goals for land management and community protection, managers are increasingly challenged to justify treatments and to address questions concerning effects of increased levels of fuels treatment, or altered fire regimes, on threatened or endangered species, invasive plant species, wildlife habitat, air quality, and similar topics. The JFSP identifies the science and tools needed to address a range of issues facing fire and fuels managers and policymakers, issues Announcements for Proposals (AFPs, formerly Requests for Proposals or RFPs), and competitively funds research projects to help answer current questions and to address and anticipate questions of the near future.

The Roles of Science in Managing and Resolving Wildland Fire and Fuels Issues

The Management Dilemma

Resource managers are increasingly challenged by the need to justify and apply scientifically sound solutions to complex problems during the planning and implementation of on-the-ground projects. Science-based decision making has always been needed, but the demand for research-based solutions is increasing as management agencies strive to take proactive approaches to addressing fuel problems and restoring fire-adapted ecosystems. Managers are often unaware of completed and ongoing research that may be helpful. But the need for new information and tools is also increasing as treatments are applied in visible urban interface areas and across larger areas of the landscape. New questions arise about the response of invasive plant species to fuel treatments, or the impacts of fuel treatments on carbon storage, or the best ways of interacting with communities in the wildland-urban interface, or the impact of different degrees of landscape-level fuels treatments on wildlife habitat or on endangered or threatened plant and animal species, and other matters.

Help from Research

The research community, including Federal, university, and nonprofit organizations, and others, recognizes the urgent need to identify critical science needs and develop information and decision support tools for addressing land management issues as quickly and efficiently as possible. Recent JFSP projects involve all 6 JFSP partners, other Federal agencies such as NASA and USDA Agricultural Research Service, 45 universities, State and local agencies such as St. John's Water Management District in Florida and the Kenai Borough in Alaska, not-for-profit groups such as Tall Timbers Research Station and The Nature Conservancy, and other organizations such as the Tanana Chiefs Conference in Alaska. Several for-profit companies also have contracts to complete parts of projects. Research projects or study sites are located in 43 States, Puerto Rico, and the District of Columbia.

Joint Fire Science Program Approach

Through manager-scientist partnerships, the research community is actively pursuing solutions to the problems land managers face. The JFSP requires Federal agency participation in all JFSP-funded projects and strongly encourages the inclusion of land managers on the project teams. In addition, language was added in the 2003 AFPs stating that proposals for work to address local management needs should respond to issues identified by and initiated by land managers. Finally, transferring the information and tools developed to users is a required cornerstone of every JFSP-funded project.

History of the Joint Fire Science Program

The JFSP, a partnership of six Federal wildland management and research organizations, was authorized and funded by Congress in 1998. An appointed 10-member Governing Board representing the six partner agencies oversees and manages the program. Since its inception, the JFSP has issued 9 AFPs, received nearly 500 proposals, and funded 178 projects (Table 1). Three additional AFPs, posted on October 15, 2002, closed on January 6, 2003. Additional JFSP information is available on the Internet at: http://www.nifc.gov/joint_fire_ sci/jointfiresci.html

Table 1

Highlights	FY 2002	FY 1998 - 2001	Totals
Closing Dates for AFPs	2	7	9
Proposals received	117	382	499
Projects funded	60	118	178
Funds Obligated (millions)	15.7	40	55.7

JFSP Guidance

JFSP works within overall program guidelines that have been set by Congress in the annual Appropriations Acts for the Department of the Interior and Related Agencies, rather than in NFP documents. Nonetheless, program objectives and priorities are generally supportive of needs for NFP implementation and assessment.This guidance includes four original "principal purposes"—all related to wildland fuels—and subsequent guidance provided in 2001 that included added emphasis on postfire stabilization and rehabilitation, aircraft-based remote sensing,"rapid response" projects to capture time-sensitive data on active or very recent wildland fires, local research needs, increased emphasis on technology transfer, and response to the NFP. This guidance is further interpreted in the JFSP Plan submitted to Congress in January 1998, in internal program documents, and through discussions and inputs from stakeholders, including a FACA (Federal Advisory Committee Act) advisory group, agency fire directors, field managers, policymakers, and the science community.

2002 Joint Fire Science Program Projects

In 2002, the JFSP competitively funded 60 projects including 53 new research projects, 3 workshops or symposia, additional work for 2 existing projects, funding for the third year of the "Fire and Fire Surrogates" project, and initiation of the development of an administrative database for the JFSP. The new research projects include projects in support of wildland fuels management, postfire stabilization and rehabilitation, local research needs, demonstration sites, aircraft-based remote sensing, and rapid response projects. All of the projects directly or indirectly support the key points in the NFP. A list of 2002 projects is included in Appendix A, and a complete list of all active JFSP projects is included in Appendix B (summarized in Figure 1). In addition to ongoing research, the JFSP has increased its focus on technology transfer—getting new information and tools into the hands of end users. In 2002, JFSP-funded scientists published 172 papers, conducted 170 field trips with managers, participated in 186 workshops or symposia, participated in 164 training sessions, developed 30 Web pages for posting current and relevant project information, and developed and distributed 48 compact disks or other technology transfer media.

Figure 1

- Administrative Studies & Local Needs (36)
- Fire Effects and Fuel Treatment Effects (39)
- Demonstration Site Projects (26)
- Planning & Preparedness (15)
- Remote Sensing (15)
- Air Quality, Smoke Management, and Climate (12)
- Social & Economic Impacts (6)
- Fire & Invasive Plant Species (5)

Accomplishments

JFSP-funded research is producing new information and tools for use by fire and fuels managers, agency administrators—and other specialists, decision makers, and the JFSP Governing Board—is focusing on the delivery of that information and those tools to end users. Areas of recent accomplishments include smoke management, environmental effects of fire and fuels treatments such as soil erosion and changes in wildlife habitat, fire behavior, relationships between fire and invasive species, social sciences, and related topics. Examples include:

t"Photo Series"—booklets designed for field and office use—contain stereo photo pairs and detailed fuel inventory data from the photo sites. These photo series allow fire and fuel managers and other interested parties to quickly and accurately match photos with sites being evaluated and assess fuel loadings. This information is necessary to plan prescribed fires, project fire behavior, evaluate wildland fire use incidents, and related purposes. Approximately 40 photo series have been produced over the past 20 years. Many ecosystems in the United States have applicable photo series for natural and activity fuels. In 1998, the JFSP funded development of several additional photo series for fuel types identified by managers as important for fire and fuel management. Under this project, series are being developed for various fuel types in Hawaii, jack pine, Alaska birch and aspen, southeastern fuel types, northeastern fuel types, ponderosa pine, Douglas-fir/hemlock, and invasive grasses and perennial plants in the Western U.S. The first of these photo series will be completed in early 2003. When published, these photo series will be available from the Publication Management System at the National Interagency Fire Center in Boise, Idaho. Additional information is available on the Internet at:http://www.fs.fed.us/pnw/fera/jfsp/photoseries/ The lead scientist is Roger Ottmar, Forest Service, Pacific Northwest Research Station (PNW). Collaborators include Robert Vihnanek, PNW Station; Colin Hardy, Forest Service, Rocky Mountain Research Station (RMRS); David Weise, Forest Service, Pacific Southwest Research Station (PSW); Dale Wade, Forest Service, Southern Research Station (SRS); Mike Hilbruner, Forest Service, Washington Office; Larry Vanderlinden, U.S. Fish and Wildlife Service, Alaska; and Ron Moody, Forest Service, Southwestern Region.

tA computerized "Ventilation Climate Information System" was recently completed. It is a management tool to help analyze smoke and other pollutants produced by prescribed and wildland fires. The system is based on a 40-year database that includes twice-daily values of wind, mixing height, and a ventilation index that is the product of wind speed and mixing height. Data are spatially interpolated to a grid of about 5 kilometers on a side. The system accurately predicts "inversions" and related phenomena that result in reduced visibility on highways and other areas and that have impacts on human health. It is of particular use for planning prescribed fires and for predicting wildfire smoke dispersion and smoke events for health officials, air quality management agencies, managers of aerial fire suppression resources including airtankers and helicopters, law enforcement agencies, and fire planners.

Training sessions are being conducted for fire managers and air quality regulators in Florida, the Pacific Northwest, and other areas to transfer the technology. The Ventilation Climate Information System and information on how to use it are on the Web at: http://www.fs.fed.us/pnw/fera/vent. The lead scientist is Sue Ferguson, PNW Station. Collaborators include David Sandberg, PNW Station; Richard Fisher, RMRS Station; Deirdre Dether, Forest Service, Intermountain Region; Bob Hammer, Forest Service, Northern Region; Dave Levinson, Bureau of Land Management, Montana; Marcus Schmidt, Bureau of Land Management, Colorado; and Christie Neill, Forest Service, Pacific Southwest Region.

t A computerized "Forest Vegetation Simulator," which is widely used in developing land management plans and other purposes, lacked a method of considering the impacts of disturbances such as wildland fire and fuels management. To fill this gap, JFSP supported development of a "Fire and Fuels Extension"(FFE). This extension accepts user-supplied data to model stand impacts of various treatments such as thinning and fire. The extension uses existing models of fire behavior, including crowning, and fire effects, along with new models that represent snag dynamics and downed wood decomposition. FFE "Variants" are available for different regions, including several in the West and are being calibrated for eastern forests. The extension, when used with the parent model (Forest Vegetation Simulator), is a particularly valuable method to help land managers plan treatments and understand stand succession with various disturbance regimes. For example, the FFE was used to help determine the best combination of fuels treatments to reduce wildland fire hazard in the Coeur d'Alene area, Idaho. A training package for the FFE is under development. The FFE of the FVS is available through: http://forest.moscowfsl.wsu.edu/4155/ffe-fvs.html. The lead scientist is Nick Crookston, RMRS Station. Collaborators include Colin Hardy and Elizabeth Reinhardt, RMRS Station; Marc Wiitala, PSW Station; and Werner Kurz and Sarah Beukema, ESSA Technologies, Vancouver, BC.

t An understanding of the effects of fire is necessary to plan and implement wildland fire and fuels projects. Historically, this understanding was achieved through a time-consuming and often incomplete literature search, review, and interpretation. The First Order Fire Effects Model, or FOFEM, has been developed and refined to help managers and specialists obtain rapid and consistent information about certain fire effects including tree mortality, fuel consumption, smoke production, and soil heating. These quantitative predictions of first order effects are needed for planning of prescribed fires, impact assessment, and long-range planning and policy development. Specific uses of FOFEM include identifying acceptable upper and lower fuel moisture limits for prescribed fire planning and implementation; determining the number of treatment acres that can be completed in one day to prevent exceeding particulate emission limits; developing postfire timber salvage guidelines; and comparing expected outcomes of alternative actions. FOFEM can be accessed at: http://www.fire.org/cgibin/nav.cgi?pages=fofem&mode=1. The lead scientist is Elizabeth Reinhardt, RMRS Station. Robert RKeane, also of the RMS Station, is a major collaborator.

t Managers need tools that allow them to evaluate how emissions from prescribed fires, which are conducted to reduce fire hazard, compare with, or affect potential regional emissions of, wildland fire smoke. The Fire Effects Tradeoff Model, FETM, has been developed to help managers determine if, and which, prescribed fires result in less overall burden on the airshed. The model is a stochastic, dynamic, non-spatial simulation model designed to simulate the tradeoffs between wildland fire and various fuel treatment alternatives at the landscape level over long periods of time (up to 300 years) and under diverse environmental conditions, natural fire regimes, and management policies. Land managers are currently being trained in use of the model. Additional information is posted on the Internet at: http://www.fs.fed.us/r6/aq/welcome.htm. The project manager is Jim Russell, PNW Region. Collaborators include J. Kendall Snell, PNW Region; Mark Schaaf, CH2M Hill, Inc.; Roger Ottmar, PNW Station; Michael Arbaugh, Marc Wiitala, and Richard Kimberlin, PSW Station; Philip Omi, Colorado State University; and Don Carlton and John Nesbitt (both retired, PNW Region).

t The third volume in a five-volume series on wildland fire in ecosystems has been completed and is in press at the Rocky Mountain Station. "Effects of Fire on Air" will be an excellent resource for fire managers and planners, as it details the current status of air quality regulations related to wildland fire, as well as the status of knowledge on the composition and intensity of emissions from fires in different ecosystems. The fourth and fifth volumes in the series, "Effects of Fire on Soil and Water" and "Effects of Fire on Cultural Resources" will be published in the spring of 2003. The first two volumes of the series, "Effects of Fire on Fauna" and "Effects of Fire on Flora" were published in 2000. The "Effects of Fire on Fauna" can be found on the Web at: http://www.fs.fed.us/rm/pubs/rmrs_gtr42_2.html and the "Effects of Fire on Flora" can be found on the Web at: http://www.fs.fed.us/rm/pubs/rmrs_gtr42_1.html. Because of their popularity, both volumes have been reprinted to meet demand from the management community. The lead scientist is Kevin Ryan, RMRS Station. Major collaborators include Marcia Patton-Mallory, Roger Hungerford (retired), Jane Smith, Jim Brown (retired), Dan Neary, Wei-Min Hao, and Colin Hardy, RMRS Station; Elizabeth Mozzillo, National Park Service, Bandelier National Monument; David Sandberg, Sue Ferguson, Joan Landsberg, Roger Ottmar, Colin Hardy, and Ellen Eberhardt, PNW Station; Janet Sullivan and Tim Reinhardt, private contractors; and Janet Peterson, PNW Region.

t The identification and description of hazardous fuels is difficult and time consuming and has rarely been completed for entire States. Fuel accumulation is also dynamic, so currency of data is important for decision makers. Such inventories have recently been completed for Montana and New Mexico. These JFSP-funded studies, in cooperation with managers from the Forest Service, Bureau of Land Management, Bureau of Indian Affairs, Tribes, Los Alamos National Laboratory, private companies, and the respective States, used Forest Inventory and Analysis data to determine the magnitude of hazard reduction treatment needs, treatment costs, and associated benefits at the State level. The reports are being used by land managers to plan and implement fuels treatments. Project reports are available in PDF format on the Internet at: http://www.nifc.gov/joint_fire_sci/ummontanarpt.pdf (for Montana) and http://www.nifc.gov/joint_fire_sci/NMreport.pdf (for New Mexico). The reports also provide discussions on treatment effectiveness, treatment costs and industry infrastructure, and related topics. The lead scientist is Carl Fiedler, University of Montana. Major collaborators include Charles Keegan III, Stephen Robertson, Todd Morgan, Chris Woodall, and John Chmelik of the University of Montana; and Jamie Barbour and Roger Fight, PNW Station.

Research Highlight

Fire and invasive annual grasses in western ecosystems

The invasion of annual grasses on postfire landscapes is of significant concern worldwide, but especially in the Western United States. When these grasses invade arid and semi-arid shrublands that historically burned with low frequency, they create fuel conditions that promote frequent fires. In ponderosa pine forests with historically high fire frequencies—where wildland fires are often allowed to burn, and prescribed fires are implemented to reduce fuel loadings—encroachment by annual grasses has complicated the use of fire to manage fuels.

Scientists are investigating the role fire plays in promoting the dominance of invasive annual grasses in areas such as the Great Basin sagebrush steppe, creosote bush scrub, and ponderosa pine forest.The research approach is multi-faceted. Scientists are conducting extensive field surveys to compare soil nutrient levels on sites that have and have not been invaded by grasses after fire. These field studies are complemented by laboratory studies where scientists are able to manipulate and measure fire, nutrients, fuels, and light under more controlled conditions to examine in detail the relationship(s) between soil heating and nutrient availability for invasive grasses.

Managers will be able to use the information gathered in this research effort to help determine the vulnerability of various vegetation types to encroachment by invasive grasses. This in turn will enable managers to make decisions and deploy resources before, during, and after wildland fires to mitigate the invasion. In addition, fire prescriptions can be designed to avoid situations that make sites susceptible to invasion, and rehabilitation and restoration methods can be more effectively and efficiently employed. The lead scientist is Matt Brooks, U.S. Geological Survey. Major project collaborators include Jayne Belnap and Jon Keeley, U.S. Geological Survey; and Robert Sanford, University of Denver.

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Research Highlight

Changing fire regimes, increased fuel loads, and invasive species: effects on sagebrush steppe and pinyon-juniper ecosystems

Pinyon-juniper woodlands and Wyoming big sagebrush ecosystems have undergone major changes in vegetation composition and structure since settlement by European Americans. These changes have resulted in dramatic shifts in wildland fire frequency, size, and severity that have serious implications for ecosystem health as well as for the safety and welfare of human communities.

Researchers are working on lands in Oregon, Nevada, Idaho, and Utah to better understand these changes and their impacts. The frequency, size, and intensity of fires occurring prior to European settlement are being compared to fire characteristics in the Intermountain region in the more recent past and the present day. Scientists are gathering information on how fuel loadings in these ecosystems have changed since the early 1800s and what the consequences of these changes are for ecosystem viability. The environmental and ecological factors that influence plant community susceptibility to invasive plants such as cheatgrass are also being studied.

Results from this project will provide land managers, fire managers, and other specialists with information on important topics such as the characteristics of woodlands and shrublands at greatest risk of catastrophic fire and most susceptible to cheatgrass invasion. Armed with this information, managers will be better equipped to apply prescribed fire treatments and develop strategies for using wildland fire to meet resource objectives. The lead scientist is Jeanne Chambers, RMRS Station. Major project collaborators include Richard Miller, Oregon State University.

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Research Highlight

Fire management options to control woody invasive plants in the northeastern and mid-Atlantic United States

The Northeastern U.S. is generally perceived as having a low incidence of wildfire, but it has had some extremely dry years in which catastrophic wildfire affected lives and property, such as in Maine in 1947. Fire is used in this region by managers to control unwanted vegetation, and they typically use dormant-season fire in open habitats and fire-adapted ecosystems. However, fires conducted in early spring can have the undesired effect of promoting rather than reducing undesirable plants. Little is known about the proper timing of the use of fire for various land management purposes, such as treatments to eliminate undesirable invasive plants, or the effects of these fire treatments.

Scientists are conducting studies in Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Virginia, and Vermont to compare fuels in invaded and uninvaded forest stands. As a first step, scientists are assessing fuel composition, fuel loading, and vegetation composition in all of these States. Under the direction of William A. Patterson, III, of the University of Massachusetts, a series of experiments at three sites in Massachusetts and New York have been set up to help determine the best times and methods for eradicating undesirable invasive plants and to determine how invasive plants influence fire behavior.

Dr. Patterson and his doctoral student, Julie Richburg, are carrying out experiments to determine total available carbohydrates in native and non-native shrubs to find their susceptibility to control. Experimental plots were set up in areas with and without invasive plants to assess the impacts of different fuel treatments (i.e., cut/burn/cut) and timing of fuel treatments (dormant-season versus growing-season burns) on control of invasive plants. The researchers are working on lands administered by the Forest Service, National Park Service, Fish and Wildlife Service, and some State and private landowners.

Data from this study are being incorporated into a modification of BEHAVE fuel models so that the vegetation of the Northeast is represented more accurately. Land managers will be able to use the findings of this work to help plan and implement sustainable forest practices to control invasive plants, reduce the spread of unwanted wildland fire, decrease risk of wildfire spreading from public lands into surrounding communities, and improve forest health.

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Research Highlight

A national study of the consequences of fire and fire surrogate treatments

For decades, land managers have altered forest structure through prescribed fire and fire surrogate treatments such as thinning. Although these practices are common, scientific knowledge on their costs and ecological consequences is limited. In addition, the efficacy of treatments for reducing wildland fire hazard is not well known across different fuel types.

A large-scale coordinated effort to quantify the costs and effects of fire and fire surrogate treatments is underway on 13 sites across the United States. Ecosystems chosen for inclusion in this study are those known to have historically short fire return intervals. Treatments and measurements used in this study are rigorous and consistent across study areas. This unique approach will allow comparisons not only within sites but also across sites.

Study sites are located in Washington, Oregon, California, Arizona, New Mexico, Montana, Florida, Ohio, South Carolina, Alabama, and North Carolina. Treatments include 1) mechanical treatment alone; 2) prescribed fire alone; 3) mechanical + fire; and 4) untreated control. More than 50 important variables are being measured and analyzed, representing seven major disciplines: vegetation, fuels and fire behavior, soils and the forest floor, wildlife, entomology, pathology, and economics.

This truly collaborative effort involves more than 105 scientists and 50 managers at local, regional, and national scales. Participant organizations include the Forest Service, National Park Service, 12 universities in 10 States, 5 State forestry departments, and 3 nongovernmental organizations. These partnerships have helped to improve study design, implement treatments, analyze data, and enhance technology transfer efforts. Information gained through the project to date has been communicated through 10 master's theses, 45 publications, 25 site tours, and 26 workshops.

Results from this study will help land managers and a wide variety of specialists plan and implement appropriate land and fuels management treatments. Major conclusions and recommendations from this study are expected by the end of 2004. Additional information on the project is available on the Internet at: http://ffs.psw.fs.fed.us/.

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Research Highlight

Rapid response: effect of fuel treatments on fire severity

There is considerable speculation by fire managers and researchers that treatments implemented to reduce or alter wildland fuels will reduce wildfire severity, make fires easier to control, and consequently reduce fire suppression costs. However, the effectiveness of fuel treatments in reducing fire severity has not been thoroughly documented scientifically. Much of the existing documentation consists of retrospective rather than real-time or near real-time observations and measurements.

Scientists at Colorado State University, with support from JFSP, used a "rapid response" approach to evaluating fuels treatments. They were prepared to quickly mobilize, travel to the fire location, and begin gathering data quickly—while the wildfire was burning or shortly after the fire was contained—while time-sensitive evidence was still available.

During 1999 and 2000, university scientists traveled to wildland fires in Colorado, New Mexico, California, and Mississippi to observe and compare fire effects in areas where fuels had been subjected to treatments (mechanical thinning, prescribed fire, or both), with fire effects in adjacent untreated areas. Researchers were particularly interested in gathering information on how these areas varied with respect to occurrence of crown fire, the fire's resistance to control, and fire severity.

In all comparisons made to date in the course of this study, fires were less severe on treated stands than on untreated stands burning under similar weather and topographic conditions. Correlations between fire severity and both crown fire hazard and fire resistance to control were good, but individual sites provide unique lessons that illustrate the importance of treating fuel profiles in their entirety. Both the small percentage of wildfires that encounter fuel treatments and the small scale of treatments within the wildfires suggest the enormity of the task at hand.

Information generated by this study is already being used by fire and land managers to help plan and implement appropriate and effective fuels treatments. In addition, results of this work have been cited in the President's Healthy Forests Initiative and in Congressional testimony by Secretary of Agriculture Ann Veneman and Secretary of the Interior Gail Norton. Additional information on this research is available on the Internet at: http://www.cnr.colostate.edu/FS/westfire/FinalReport.pdf

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Research Highlight

Quantification of canopy fuels in conifer forests

Methods to estimate wildland surface fuel loadings have been developed over many years and are used routinely to project fire behavior. This information is critical for fire managers in planning attacks on wildfires, deploying firefighting resources, and conducting prescribed burns. However, no methods have been developed for measuring the fuel loadings in the aerial (crown) portions of standing trees. Consequently, little is known of crown fuels or their contribution to fire spread and behavior.

Scientists are working to develop a consistent, reproducible, broadly applicable method for estimating canopy fuel characteristics for fire modeling. Such a method would make models of crown fire occurrence and behavior more usable. In addition, effects of treatments on crown fire risk could be more accurately predicted, maps of crown fuels could be more consistently portrayed across administrative boundaries and ecological types, and fire behavior models used for landscape-scale planning processes could be improved.
The study involves sample stands in a diversity of western conifer ecosystems, including Douglas-fir, ponderosa pine, mixed conifer, and lodgepole pine. Field work and preliminary data analysis are complete. Final correlations and interpretations for managers will be published in a series of papers in 2003.

Climbing high above the forest floor, scientists and technicians are harvesting and intensively sampling canopy fuels in a small number of forest types to determine their fuel loading characteristics. The sampling is done progressively to simulate removing trees and sequentially moving toward sparser canopy densities.

At the same time, indirect measures of canopy fuel characteristics at different "treatment" levels, which are typically easier to obtain, are being correlated with values obtained via intensive sampling. Photographs are also taken to document treatment effects. If the correlations are robust across the range of forest types and stand densities studied, they will be extremely useful to managers in efficiently quantifying canopy fuels, in a variety of landscapes, for wildland fire planning and project implementation.
Additional information about this project is available on the Intranet at :http://firelab.org/fep/research/canopy/canopy%20home.htm

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Research Highlight

Baker City Watershed Pilot Demonstration Project—where there is smoke, there are scientists

The Baker City Municipal Watershed within the Wallowa/Whitman National Forest, Oregon, provides unfiltered potable water to 10,000 people. This watershed is currently at risk of severe wildfire due to the high fuel accumulations that could jeopardize Baker City's water supply. The watershed was selected as a national pilot demonstration site for fuel treatment options including thinning and prescribed fire. This work to reduce the risk of severe wildfire in the watershed was initiated with support from the NFP and the JFSP.

At the request of the Wallowa/Whitman National Forest, the Fire and Environmental Research Applications Team (FERA) of the Forest Service's Pacific Northwest Research Station (PNW) provided a science basis for fuel treatment decisions and completed required monitoring of fuel changes over time for each phase of the pilot project. FERA also coordinated several research projects funded by the NFP and the JFSP to study the fuel consumption, heat release, smoke production, and movement of smoke from the prescribed burning portion of this pilot demonstration.

Thirty scientists from both FERA and the Fire Effects, Fire Behavior, and Fire Chemistry Projects of RMRS's Missoula Fire Laboratory deployed a series of experiments requiring 60 ground fuel and fuel consumption monitoring plots, 2 smoke sampling towers, 2 trace gas and radiation sensing instruments, a radiation imaging aircraft, a tethered smoke sampling balloon, and a network of 6 weather stations on the perimeter of the burn. These inventory plots and instruments were used to monitor total and rate of fuel consumption; small woody and forest floor fuel moisture content, temperature, relative humidity, wind speed and direction, and precipitation; ground and aerial heat release; ground-level smoke emissions during the flaming and smoldering phases of the fire; and aerial smoke drift concentrations down valley of the burn.

The data collected from this field-based effort will be used to improve the predictive capability of fuel consumption models such as CONSUME and the First Order Fire Effects Model (FOFEM), and the Emission Production Model (EPM), and smoke dispersion models such as CALPUFF and VSMOKE. Information gathered in this effort will help scientists refine computer models to provide managers with better tools for predicting how much smoke will be emitted by a fire and where that smoke will go and concentrate. Such information enables managers to plan prescribed fires to minimize smoke impacts.

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Research Highlight

Mechanical midstory reduction treatments: an alternative to prescribed fire

While prescribed fire is a common tool for reducing wildland fuel volumes, it may not be a viable management alternative near densely populated areas where smoke production may preclude its use. In these situations, land and fire managers must look to alternative mechanical methods to reduce fire danger and improve stand health. The use of mechanical methods is not without its own complexities, however. Not all pieces of equipment used in mechanical thinning may be acceptable on all sites—treatment objectives, size of treatment area, slope, and other factors all need to be considered.

The Forest Service Southern Station unit in Auburn, Alabama, is conducting a comprehensive review of mechanical technology for fuel reduction. Key areas of project emphasis include mulching technology to masticate biomass onsite or offsite and some fundamental variations of machine types used in mulching operations. Studies on the rates of machine production and costs are being conducted in different forests on different soil types. Scientists are also working to determine the proper interval between mechanical treatments and the subsequent reintroduction of fire. A long-term wildlife monitoring project has been installed on one experimental unit to determine whether the changes in forest structure from mechanical thinning will result in changes in resident wildlife populations.

Recent findings suggest that while mechanical treatments are generally cost-effective, poor selection of equipment and poor definition of the work to be accomplished can lead to unnecessarily expensive treatments. Fire and land managers are already beginning to use this new information on mechanical treatments and equipment to plan and implement fuels treatments. Technology transfer sessions are being provided throughout the Southeast and the West. Additional information is available on the Internet at:
http://www.srs.fs.fed.us/forestops/projects/proj2.pdf

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Research Highlight

Southern Utah fuels management demonstration project

Many areas throughout the United States, including southern Utah, are facing multiple threats of increasing fireline intensity, increasing residential growth in areas prone to wildland fire, and increasing suppression costs and losses. To mitigate these threats, managers are looking to increase efforts directed at reducing levels of hazardous fuels through fuel treatments.

The southern Utah fuels management demonstration project is designed to enable managers and researchers to compare first hand the effects of alternative fuel treatments such as thinning, pruning, and prescribed burning. On the demonstration site, managers will be able to rigorously test proposed fuel treatments that serve to reduce the possibility of extreme wildfire events and restore or maintain the ecological role of fire on the landscape. The project area includes lands administered by the Forest Service, Bureau of Land Management, National Park Service, and the State of Utah.

In the course of this project, scientists are developing and demonstrating the use of fire behavior and effects models and GIS tools. Information obtained through this demonstration project will help land and fire managers to prioritize, select, and implement fuel treatment and fire restoration projects within and across land ownerships on 15 million acres across southern Utah and northern Arizona. The project is expected to be completed in 2003.

Fire effects and fire behavior models being used in this project include:

- NEXUS to determine the effect of combinations of thinning, pruning, and fuel removal on the likelihood of a surface vs. crown fire;
- FOFEM for evaluating the effects of fire on fuel consumption, smoke estimation, tree mortality, soil heating, and mineral soil exposure;
- FARSITE and FlamMap for selecting watersheds and landscapes in order to determine the size, shape, and configuration of treatments necessary to modify fire behavior and the spread of large fires;
- FIREHARM to prioritize fuel treatments within the study area; and
- LANDSUM to evaluate successional disturbance.

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Research Highlight

Evaluating public response to wildland fuels management: factors that influence acceptance of practices and decision processes

Citizen support is an essential component of effective wildland fire and fuel management programs. This is particularly true for fuel reduction activities that often occur at the wildland-urban interface. Managers at all levels need to understand the factors that lead to citizen understanding and support as the Federal, State, and local land management agencies increase fuel treatment activities to implement the NFP.

Researchers are evaluating public understanding and acceptance of different fuel treatments with a focus on Federal forests and rangelands. Information is being gathered using a number of social science research tools. A national opinion survey is focused on assessing the knowledge, information needs, attitudes, and preferences among the American public. In addition, six regional surveys (in Oregon, Arizona, Colorado, Utah, Georgia, and Florida) are being conducted; and a series of local pilot studies where agency communication strategies are being evaluated.

Through this research project, scientists are striving to 1) identify the factors that influence the acceptability of fuel reduction strategies and decision processes, 2) examine citizens' understanding and preferences for necessary tradeoffs among management alternatives, and 3) measure public confidence in resource agencies for effective implementation of these practices. Land managers will be able to use results from this research project to more effectively plan and implement fuels projects in forest communities.

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Research Highlight

Integration of satellite data and field measurements for fire fuels mapping

Information on vegetation types and structure is required to systematically map and model wildland fuels. However, existing mapping projects using remotely sensed data often do not meet specifications for fire fuel maps and models. Specifically, remotely sensed data may not cover large enough areas, provide appropriate and accurate vegetation information, and provide information with adequate spatial detail. Although the acquisition and use of satellite data is relatively well established for operational land cover mapping, this is not the case for large-area vegetation mapping and characterization.

Researchers are working to determine how ground-measured vegetation variables in sufficient quantity and quality can be used to facilitate satellite mapping of fuel types and structure characteristics. The primary source of ground-based data is Forest Inventory and Analysis data, collected periodically by the Forest Service. In addition, the Landsat 7 Enhanced Thematic Mapper Plus 30-m data, processed to the highest geometric and radiometric levels, are being merged with other environmental data layers such as climate data to improve mapping accuracy. Also, several nonparametric mapping models are being adapted and compared for their effectiveness in spectrally and ecologically extrapolating the forest variables that are measured on forest inventory plots.

Areas being used to test the validity of these new maps and models include the Wasatch and Uinta Mountains of Utah, the Tenderfoot Experimental Forest in Montana, and the Mid-Atlantic Coastal Plains. The improved maps and models developed through this research project will help local, regional, and national land and fire managers to obtain accurate assessments of wildland fuels situations and to plan and implement land management treatments. Additional information is available on the Internet at: http://edcwww.cr.usgs.gov/firescience.

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Additional Joint Fire Science Program Information

Stakeholder Advisory Group

The Secretaries of Agriculture and the Interior chartered a JFSP Stakeholder Advisory Group under the Federal Advisory Committee Act. The group provides advice and recommendations on current and future research and priority research and technology transfer needs and other inputs on JFSP focus and management to the JFSP Governing Board. The 30-member group includes 15 Federal members representing the JFSP partners as well as NASA, DoD, EPA, NOAA/NWS, DoE, and NRCS. The 15 non-Federal members represent diverse groups such as the Western Regional Air Partnership, State forestry organizations, private landowners, county commissioners, and universities. The group meets annually or as needed to conduct group business.

Program Review

In accordance with the JFSP Plan, a 5-year program review was completed in September 2002. A 12-member review team, led by Bob Abbey, BLM Nevada State Director, and Peter Roussopoulos, Director of the Southern Research Station, conducted the review. The team specifically looked into four areas: program direction, technology transfer, stakeholders and partnerships, and program administration. The report was generally strongly supportive of the program. Nonetheless, the review team made more than 20 recommendations to improve the JFSP, including broader dissemination of AFPs and improved technology transfer. The JFSP Governing Board is developing a plan for responding to and implementing the recommendations. The major findings of the report include:

- Research funded through the JFSP is being conducted on a good distribution of topics, consistent with the original direction of the Congress.
- Methods used by researchers to deliver research results to managers vary widely. The program relies primarily on the JFSP Web page to transfer information to stakeholders.
- The JFSP has a broad range of stakeholders and partners. Steps are being taken to coordinate better with other fire research organizations.

Major recommendations include:

- The JFSP needs to take a more proactive approach for soliciting rapid response projects.
- The JFSP should develop a technology transfer plan to more systematically publicize, release, and announce AFPs and research products.
- The JFSP should continue to encourage and support efforts to coordinate across fire research organizations to make the best use of scarce research dollars.

Conclusion

The JFSP is a dynamic program that actively seeks input from partner agencies, a Stakeholder Advisory Group, Congress, and others to determine needs and priorities, fund appropriate research projects, and ensure delivery of information and tools to end users. The diversity of expertise in both the Governing Board and the Stakeholder Group helps ensure that the program takes a balanced approach to setting priorities and making funding decisions. Products from JFSP projects are helping meet needs for new information and tools, and for information dissemination to users in support of science-based planning and implementation of wildland fuels treatments and related activities on lands managed by Federal agencies and cooperators. JFSP provides a unique role in wildland fire research that complements base research programs in several agencies and NFP research in the Forest Service. A newly formed interagency Fire Research Coordination Council, which has as one of its key goals the coordination of fire-related research programs across Federal agencies, will play a key role in continuing to ensure the most effective and efficient coordination of activities among the various programs.

2002 Joint Fire Science Program Research Projects and Principal Investigators

Unit*	Project Title	Principal Investigator	e-mail address
PNW	Fire and fire surrogates	Jim McIver	jmciver@fs.fed.us
RMRS	Additional work – canopy fuels project	Liz Reinhardt	ereinhardt@fs.fed.us
University of Alaska	Development of a computer model for management of fuels	Scott Rupp Randi Jandt	srupp@lter.uaf.edu
RMRS	Historical wildland fire use: lessons to be learned from 25 years of wilderness fire	Matt Rollins	rrollins@fs.fed.us
SRS	Economic impacts of biomass removal	Jeffrey Prestemon	jprestemon@fs.fed.us
RMRS	Cumulative effects of fuel on landscape - scale fire behavior and effects	Mark Finney	mfinney@fs.fed.us
RMRS	Prescribed fire strategies to restore wildlife habitat in ponderosa pine forests	Vicki Saab Natasha Kotlier	vsaab@fs.fed.us
RMRS	Developing statistical wildlife habitat relationships for assessing cumulative effects of fuel treatments	Kevin McKelvey	kmckelvey@fs.fed.us
Duke University	Incorporating spatial heterogeneity into fire restoration plans	Dean Urban	deanu@duke.edu
SRS	Fuel classification for the southern Appalachian Mountains	Tom Waldrop	twaldrop@fs.fed.us
PNW	Use of high-resolution remotely sensed data in estimating crown fire behavior	Steve Reutebuch Gerard Schroeder	sreutebuch@fs.fed.us
USGS	Advanced remote sensing technologies for monitoring postburn vegetation	Ralph Root	ralph_root@usgs.gov
NPS	Fire effects on regional air quality including visibility	Bill Malm	malm@cira.colostate.edu
FS	Fire and Fuels Extension to the Forest Vegetation Simulator	Gary Dixon	gdixon01@fs.fed.us
PNW Coordination Ctr.	Techniques for creating a national interagency process for predicting preparedness levels	Gerry Day	gerry_day@or.blm.gov
The Nature Conservancy	Demonstration sites in northern Arizona	Ed Smith Linda Wadleigh	ebsmith@flagstaff.az.us
FWS	Prescribed fires in Mid-Atlantic Coastal Plain forests	Oliver Pattee	hank_pattee@usgs.gov
FWS	Prescribed fire for fuel reduction in northern mixed grass prairie	Robert Murphy	bob_murphy@fws.gov
Prescott College	Weed invasions following fire in southwestern Colorado	Lisa Floyd-Hanna	lfloyd-hanna@prescott.edu
FWS	Effects of prescribed grazing and burning treatments in alien grass-dominated wildland-urban interface areas	Mick Castillo	Mick_Castillo@fws.gov
Yosemite National Park	Identifying reference conditions for prescribed fire management - Yosemite National Park	Kara Paintner	kara_paintner@nps.gov
San Juan National Forest	Fire and forest structure across vegetation gradients in San Juan NF, Colorado	Rosalind Wu	rwu@fs.fed.us
Umatilla National Forest	Evaluating the effects of prescribed fire and fuels treatment on water quality and aquatic habitat	Caty Clifton	cclifton@fs.fed.us
RMRS	Experimental studies of the role of fire in restoring and maintaining arid grasslands	Carl Edminster	cedminster@fs.fed.us
FS Pacific Southwest Region	Workshops for fire effects information for the Manual of California Vegetation	Neil Sugihara	nsugihara@fs.fed.us
DOI	Predicting the invasion and survival of the exotic species *Paulownia tomentosa* following burning in pine and oak-pine forests	Michael Jenkins	mike_jenkins@nps.gov
Colorado State University	JFSP Database	Carol Simmons	carols@nrel.colostate.edu
Remote Sensing Applications Center	Field measurements for the training and validation of burn severity maps	Thomas Bobbe	tbobbe@fs.fed.us
SRS	The Flomaton Natural Area	John Kush Charles McMahon	kushjoh@auburn.edu
SRS	Dormant-season prescription fires to reduce hazardous fuel loads	Dale Wade	rxfire@ix.netcom.com
SRS	Long-term dormant-season burning interval study	Dale Wade	rxfire@ix.netcom.com
SRS	Frequency and season of prescription fires to reduce hazardous fuel loads	Dale Wade	rxfire@ix.netcom.com
Boise National Forest	Impacts of prescribed burning on the survival of Douglas-fir and ponderosa pine in the Boise NF	Robert Progar	rprogar@fs.fed.us

Unit*	Project Title	Principal Investigator	e-mail address
Washington State University	Management of fuel loading in the shrub-steppe	Steven Link	slink@tricity.wsu.edu
USGS	Pre-fire fuel manipulation impacts on alien plant invasion of wildlands	Jon Keeley	jon_keeley@usgs.gov
Klamath Bird Observatory	Ecological effects of fire suppression, fuels treatment, and wildfire through bird monitoring	John Alexander	jda@klamathbird.org
Utah State University	Using cattle as fuel reduction and seeding agents in annual and perennial grass stands in the Great Basin	Christopher Call	cacall@cc.usu.edu
RMRS	Effects of fire and rehabilitation seeding on sage grouse habitat	Jeanne Chambers	jchambers@fs.fed.us
FWS	Effects of prescribed fire on the invasion of northern mixed-grass prairie by non-native plant species: implications for restoration of endangered ecosystem	Cory Rubin	Cory_Rubin@fws.gov
PSW	Fuel reduction effects on a key Sierra food web	Malcolm North	mnorth@fs.fed.us
Oregon State University	Interactions of burn season and ecological condition on ecosystem response to fire in mountain big sagebrush communities	Boone Kauffman	boone.kauffman @orst.edu
USGS	Quantification of fuel in Baccharis (coyote bush) shrub types: assessing fuel loading using destructive and non-destructive methods	Will Russell	wrussell@usgs.gov
NES	Integrating prescribed fire into management of mixed-oak forests of the Mid-Atlantic Region	Patrick Brose	pbrose@fs.fed.us
PNW	Effects of season and interval of prescribed burns in a ponderosa pine ecosystem	Walter Thies	wthies@fs.fed.us
PSW	Fire regimes of forests in the peninsular and transverse ranges of southern California	Carl Skinner	cskinner@fs.fed.us
BLM	Development of a methodology for building a long-term fire history in Great Basin Valley landscapes	Pat Barker	jbarker@nv.blm.gov
Oregon State University	Fire knowledge for managing Cascadian whitebark pine forests	Michael Murray	michael_murray@nps.gov
NPS	Fuels management and non-native plant species: an evaluation of fire and fire surrogate treatments	Tim Bradley	tim_bradley@nps.gov
PSW	Fire effects on rare flora and fauna in southern California	Jan Beyers	jbeyers@fs.fed.us
University of Alaska	Fire in the west: a climate fuels assessment symposium	Tom Swetnam	tswetnam@ltrr.arizona.edu
USGS	Symposium: fire and invasive plant ecology	Matt Brooks	matt_brooks@usgs.gov
RMRS	Evaluating high-resolution hyperspectral images	Pete Robichaud	probichaud@fs.fed.us
FS	Real-time evaluation of effects of fuel treatments and other previous land management activities on fire behavior during wildfires	Jo Ann Fites-Kaufman	jfites@fs.fed.us
Montana State University	Armells Creek prescribed fire demonstration project	Clayton Marlow	cmarlow@montana.edu
NPS	Managing fuels in northeastern barrens	David Crary	David_Crary@nps.gov
SRS	An integrated assessment of the historical role and contemporary uses of prescribed fire in southern Appalachian ecosystems	James Vose	jvose@fs.fed.us
PSW	Implications of fire and fire surrogate treatments on fisher habitat in the Sierra Nevada	Richard Truex	rtruex@fs.fed.us
University of Tennessee	Fire regimes and successional dynamics of yellow pine stands in the central Appalachian Mountains	Henri-Grissino Mayer	grissino@utk.edu
USGS	Effectiveness of alien and native seed mixes in reducing cheatgrass growth and reproduction	Matt Brooks	matt_brooks@usgs.gov

Abbreviations:

BLM . . . . .Bureau of Land Management
DOI . . . . . .U.S. Department of the Interior
FPL . . . . . .Forest Products Lab
FS . . . . . .U.S. Forest Service
FWS . . . . .U.S. Fish and Wildlife Service
NCS . . . . .North Central Research Station
NES . . . . . .Northeastern Research Station
NPS . . . . .National Park Service
PNW . . . . .Pacific Northwest Research Station
PSW . . . . .Pacific Southwest Research Station
RMRS . . . .Rocky Mountain Research Station
SRS . . . . . .Southern Research Station
USGS . . . .U.S. Geological Survey

Active Joint Fire Science Program (JFSP) Projects

Fire Effects and Fuels Treatment Effects

Project ID No.	Project Title	Lead Scientist	e-mail address
98-1-1-05	Photo series for major natural fuel types of the United States – Phase II	Roger Ottmar	rottmar@fs.fed.us
98-1-1-06	Application of a fuel characterization system for major fuel types of the contiguous United States and Alaska	Roger Ottmar	rottmar@fs.fed.us
98-1-1-07	Mapping fuels using remote sensing and biophysical modeling	Robert Keane	rkeane@fs.fed.us
98-1-4-09	Stand replacement prescribed burning for fuel reduction and regeneration of Table Mountain/pitch pine stands in the southern Appalachian Mountains	Thomas Waldrop	twaldrop@fs.fed.us
98-1-4-10	Fuels management and wildlife habitat: quantity and quality relationships	R. Bruce Bury	buryb@usgs.gov
98-1-4-12	Risk assessment of fuel management practices on hillslope erosion processes	Peter Robichaud	probichaud@fs.fed.us
98-1-5-01	Fire regimes and fuel treatments: a synthesis with manager feedback	Phil Omi	phil@cnr.colostate.edu
98-1-5-02	Fire ecology information for California	Jo Ann Fites-Kaufman	jfites@fs.fed.us
98-1-8-06	A risk-based comparison of potential fuel treatment tradeoff models	David Weise	dweise@fs.fed.us
99-1-1-04	Development and delivery of the Fire and Fuels Extension to the Forest Vegetation Simulator for use by stakeholders to the Joint Fire Science Program	Nicholas Crookston	ncrookston@fs.fed.us
99-1-3-04	Develop a landscape-scale framework for interagency wildland fuels management planning	Pat Lineback	pat_lineback@nps.gov
99-1-3-06	Mechanical midstory reduction treatment: an alternative to prescribed fire	Bob Rummer	rrummer@fs.fed.us
99-1-3-08	Spatial and temporal variation in the fire regime at Monument Canyon Research Natural Area, Santa Fe National Forest	Tom Swetnam	tswetnam@ltrr.arizona.edu
99-1-3-11	Multi-century fire modeling over landscape gradients	Peter Fule	pete.fule@nau.edu
99-1-3-12	Quantification of canopy fuels in conifer forests	Elizabeth Reinhardt	ereinhardt @fs.fed.us
99-1-3-13	Carbon and nitrogen cycling by microbial decomposers following thinning and burning in a southwest ponderosa pine ecosystem	Daniel Neary	dneary@fs.fed.us
99-1-3-29	Southern Utah Fuels Management Demonstration Project	Kevin Ryan	kryan@fs.fed.us
99-1-4-01	Effect of fuel treatments on wildfire severity	Phil Omi	phil@cnr.colostate.edu
99-1-4-02	The value of fuel management in reducing wildfire damage to overstory trees	Kenneth Outcalt	koutcalt@fs.fed.us
99-1-5-04	Historic fire regimes and changes since European settlement on the northern mixed prairie: effect on ecosystem function and fire behavior	Ron Wakimoto E. Earl Willard	wakimoto@forestry.umt.edu
00-1-1-03	Changing fire regimes, increased fuel loads, and invasive species: effects on sagebrush steppe and pinyon-juniper ecosystems	Jeanne Chambers	jchambers@fs.fed.us
00-U-01	Cerro Grande post-fire inventory and analysis	Carl Edminster	cedminster@fs.fed.us
01-S-06	Additional work for quantification of canopy fuels in conifer forests	Sue Ferguson	sferguson@fs.fed.us
01-1-1-02	Development of a computer model for management of fuels, human-fire interactions, and wildland fires in the boreal forest of Alaska	Scott Rupp	srupp@lter.uaf.edu
01-1-1-05	Can wildland fire use restore historical fire regimes in wilderness and other unroaded lands?	Carol Miller	cmiller04@fs.fed.us
01-1-1-6	Historical wildland fire use: lessons to be learned from 25 years of wilderness fire management	Matthew Rollins	mrollins@fs.fed.us
01-1-2-03	In-woods decision making of utilization opportunities to lower costs of fire hazard reduction treatments	Eini Lowell	elowell@fs.fed.us
01-1-3-09	Consequences and correlates of fire in wetlands	David Brownlie	dave_brownlie@fws.gov
01-1-3-11	Duff consumption and southern pine mortality	Kevin Hiers	john.hiers@eglin.af.mil

Project ID No.	Project Title	Lead Scientist	e-mail address
01-1-3-12	Effects of prescribed and wildland fire on aquatic ecosystems in western forests (01.RMS.A.5)	David Pilliod	dpilliod@usgs.gov
01-1-3-19	Effects of fuels reduction and exotic plant removal on vertebrates, vegetation, and water resources in southwestern riparian ecosystems	Deborah Finch	dfinch@fs.fed.us
01-1-3-21	Cumulative effects of fuel management on landscape-scale fire behavior and effects	Mark Finney	mfinney@fs.fed.us
01-1-3-22	Optimizing landscape treatments for reducing wildfire risk and improving ecological sustainability of ponderosa pine forests within mixed severity fire regimes	Merrill Kaufmann	mkaufmann@fs.fed.us
01-1-3-25	Prescribed fire strategies to restore wildlife habitat in ponderosa pine forests of the Intermountain West	Victoria Saab	vsaab@fs.fed.us
01-1-3-27	Developing statistical wildlife habitat relationships for assessing cumulative effects of fuels treatments	Kevin McKelvey	kmckelvey@fs.fed.us
01-1-3-37	Landscape fragmentation and forest fuel accumulation: effects of fragment size, age, and climate	William Gould	IITF_COOP@upr.edu
01-1-3-40	Incorporating spatial heterogeneity into fire restoration plans	Dean Urban	deanu@duke.edu
01-1-3-43	Fire, management, and land mosaic interactions: a generic spatial model and toolkit from stand to landscape scales	Thomas Crow	tcrow@fs.fed.us
01-1-7-02	Photo series for major natural fuel types of the United States—Phase III	Roger Ottmar	rottmar@fs.fed.us

Planning and Preparedness

98-1-5-03	Characterizing historic and contemporary fire regimes in the Lake States	David Cleland	dcleland@fs.fed.us
98-1-8-02	Fire modeling for fuel and smoke assessment	Pat Andrews	pandrews@fs.fed.us
98-1-8-03	A national fire effects prediction model	Elizabeth Reinhardt	ereinhardt @fs.fed.us
98-1-9-06	Modification and validation of fuel consumption models for shrub and forested lands in the Southwest, Pacific Northwest, Rockies, Midwest, Southeast, and Alaska	Roger Ottmar	rottmar@fs.fed.us
98-S-1	Proposal for completion of the Rainbow Series	Kevin Ryan	kryan@fs.fed.us
99-S-1	A national study of the consequences of fire and fire surrogate treatments	Jim McIver	jmciver@fs.fed.us
99-1-3-10	Incorporation of wildland fuels information into landscape-scale land use and planning processes	Phil Omi	phil@cnr.colostate.edu
99-1-3-16	Wildland fuels management: evaluating and planning risks and benefits	Peter Landres	plandres@fs.fed.us
00-1-1-06	Development and implementation of a system for prediction of fire-induced shrub and tree mortality	Bret Butler	bbutler03@fs.fed.us
01-1-6-07	Assessing the value of mesoscale models in predicting fire danger	Sue Ferguson	sferguson@fs.fed.us
01-1-6-08	Predicting lightning risk	Sue Ferguson	sferguson@fs.fed.us
01-1-7-03	Using the NED Decision Support System to improve fuels management decision processes	Michael Rauscher	mrauscher@fs.fed.us
01-1-7-06	Techniques for creating a national interagency process for predicting preparedness levels	Gerry Day	gerry_day@or.blm.gov
01-1-7-07	Fire and Fuels Extension to the Forest Vegetation Simulator: completion of calibration for eastern forests, provisions for user training, and program maintenance	Gary Dixon	gdixon01@fs.fed.us
01-1-7-14	Decision support methods for prescribed fire	Donald MacGregor	donaldm@epud.net

Project ID No.	Project Title	Lead Scientist	e-mail address
Air Quality, Smoke Management, and Climate			
98-1-9-01	Smoke produced from residual combustion	Wei Min Hao	whao@fs.fed.us
98-1-9-03	Technically Advanced Smoke Evaluation Tools (TASET): needs assessment and feasibility investigation	Al Riebau	ariebau@fs.fed.us
98-1-9-05	Implementation of an improved emission production model	David Sandberg	dsandberg@fs.fed.us
01-S-02	4th Symposium on fire and forest meteorology	Sue Ferguson	sferguson@fs.fed.us
01-S-03	Fire and climate 2001 workshop	Francis Fujioka	ffujioka@fs.fed.us
01-S-04	Climate variability and associated wildfire implications	Jim Brenner	brennej@doacs.state.fl.us
01-U-02	Workshop on fire and climate history in western North and South America	Tom Swetnam	tswetnam@ ltrr.arizona.edu
01-1-5-01	Fire effects on regional air quality including visibility	William Malm	malm@cira.colostate.edu
01-1-5-03	Automated forecasting of smoke dispersion and air quality using NASA Terra and Aqua Satellite Data	Wei Min Hao	whao@fs.fed.us
01-1-5-06	Improving model estimates of smoke contributions to regional haze using low-cost sampler systems	Andrezj Bytnerowicz	abytnerowicz@fs.fed.us
01-1-6-01	Fire and climatic variability in the Inland Pacific Northwest: integrating science and management	David Peterson	peterson@fs.fed.us
01-1-6-05	Climatic controls of fire in the Western United States: from atmospheres to ecosystems	Steven Hostetler	steve@ucar.edu
Social and Economic Impacts			
99-1-1-01	Assessing the need, costs, and potential benefits of prescribed fire and mechanical treatments to reduce fire hazard	Jamie Barbour	jbarbour01@fs.fed.us
99-1-1-05	Integrated fuels treatment assessment: ecological, economic, and financial impacts	Hayley Hesseln	haley@forestry.umt.edu
99-1-2-08	Evaluating public response to wildland fuels management: factors that influence acceptance of practices and decision processes	Bruce Shindler	bruce.shindler@orst.edu
99-1-2-10	Demographic and geographic approaches to predicting public acceptance of fuel management at the wildland-urban interface	Jeremy Fried	jsfried@fs.fed.us
01-1-2-09	A national study of the economic impacts of biomass removals to mitigate wildfire damages on Federal, State, and private lands	Jeffrey Prestemon Karen Lee Abt	jprestemon@fs.fed.us
01-1-3-30	A social assessment of public knowledge, attitudes and values related to wildland fire, fire risk, and fire recovery	Ken Cordell	kcordell@fs.fed.us
Fire and Invasive Plant Species			
00-1-2-01	Spatial interactions among fuels, wildfire, and invasive plants	Phil Omi	phil@cnr.colostate.edu
00-1-2-04	Fire and invasive annual grasses in western ecosystems	Matt Brooks	matt_brooks@usgs.gov
00-1-2-06	Fire management options to control woody invasive plants in the Northeastern and the Mid-Atlantic U.S.	Alison Dibble	adibble@fs.fed.us
00-1-2-09	Invasive plant and fire interactions: use of the fire effects information system to provide information for managers	Kevin Ryan	kryan@fs.fed.us
01-S-05	Fire and invasive plants publication	David Brownlie	dave_brownlie@fws.gov

Project ID No.	Project Title	Lead Scientist	e-mail address
Remote Sensing			
00-1-3-01	The use of Landsat 7 (ETM+) and AVIRIS data to map fuel characteristic classes in western ecosystems	Jan Van Wagtendonk	jan_van_wagtendonk @usgs.gov
00-1-3-05	Testing an approach to improving fire fuel mapping by mapping and modeling vegetation structure and types based on combined field data	Zhiliang Zhu	zhu@usgs.gov
00-1-3-19	Monitoring fire effects at multiple scales: integrating standardized field data collection with remote sensing to assess fire effects	Robert Keane	rkeane@fs.fed.us
00-1-3-21	Validation of crown fuel amount and configuration measured by multispectral fusion of remote sensors	Jo Ann Fites-Kaufman	jfites@fs.fed.us
01-S-01	Development of a Landscape Fire Analysis Center	Lloyd Queen	lpqueen@ntsg.umt.edu
01-1-4-02	Fuel classification for the southern Appalachian Mountains using Hyperspectral Image Analysis and Landscape Ecosystem Classification	Tom Waldrop	twaldrop@fs.fed.us
01-1-4-07	The use of high-resolution remotely sensed data in estimating crown fire behavior variables	Gerard Schreuder	gsch@u.washington.edu
01-1-4-09	A novel approach to regional fuel mapping: linking inventory plots with satellite imagery and GIS databases using the Gradient Nearest Neighbor Method	Janet Ohmann	johmann@fs.fed.us
01-1-4-12	Evaluate sensitivities of burn-severity mapping algorithms for different ecosystems and fire histories in the United States	Zhiliang Zhu	zhu@usgs.gov
01-1-4-14	Advanced remote sensing technologies for monitoring postburn vegetation trends and conditions	Ralph Root	ralph_root@usgs.gov
01-1-4-15	Mapping horizontal and vertical distribution of fuel by fusing high-resolution hyperspectral and polarimetric data	Don Despain	ddespain@montana.edu
01-1-4-23	Quantitative comparison of spectral indices and transformations with multi-resolution remotely sensed data using ground measurements: implications for fire severity modeling	Jennifer Rechel	jrechel@fs.fed.us
01B-2-1-01	Field measurements for the training and validation of burn severity maps from spaceborne, remotely sensed imagery	Thomas Bobbe	tbobbe@fs.fed.us
01C-2-1-02	Evaluating high-resolution hyperspectral images	Pete Robichaud	probichaud@fs.fed.us
01C-2-1-08	Real-time evaluation of effects of fuel treatments and other previous land management activities on fire behavior during wildfires	Jo Ann Fites-Kaufman	jfites@fs.fed.us
Demonstration Site Projects			
00-2-02	Fire hazard reduction in chaparral using diverse treatments	James Dawson	jdawson@ca.blm.gov
00-2-04	Integrating fuel and forest management: developing prescriptions for the central hardwood region	Edward Loewenstein	eloewenstein@fs.fed.us
00-2-05	Kings River and Lake Tahoe Basin demonstration sites for fuel treatments	Carolyn Hunsaker	chunsaker@fs.fed.us
00-2-06	Conversion of upland loblolly pine-hardwood stands to longleaf pine	James Haywood	jhaywood@fs.fed.us
00-2-13	A comparison of silvicultural practices for controlling mountain laurel in the mixed-oak forests of Pennsylvania	Patrick Brose	pbrose@fs.fed.us
00-2-15	A demonstration area on ecosystem response to watershed-scale burns in Great Basin pinyon-juniper woodlands	Jeanne Chambers	jchambers@fs.fed.us
00-2-19	Stand and fuel treatments for restoring old-growth ponderosa pine forests in the Interior West (Boise Basin Experimental Forest)	Russel Graham	rtgraham@fs.fed.us
00-2-20	Treatments that enhance the decomposition of forest fuels for use in partially harvested stands in the moist forests of the northern Rocky Mountains (Priest River Experimental Forest)	Russel Graham	rtgraham@fs.fed.us

Project ID No.	Project Title	Lead Scientist	e-mail address
00-2-23	Managing fuels and forest structure in the southern boreal forest on Minnesota's national forests	John Zasada	jzasada@fs.fed.us
00-2-25	Demonstration plots for comparing fuel complexes and profile development in untreated stands versus stands treated for the management of spruce beetle outbreaks and implications for fuels manipulation	Elizabeth Hebertson	lghebertson@fs.fed.us
00-2-27	Maintaining longleaf pine woodlands: is mechanical shearing a surrogate for prescribed burning?	Jeff Glitzenstein	bluestemjeff@netscape.net
00-2-29	Fire application to saltcedar-dominated riparian areas: ecosystem response, prescription development, and hazardous fuels reduction	Brent Racher	racher@caprock-spur.com
00-2-30	Fire hazard reduction in ponderosa pine plantations	John Swanson	jrswanson@fs.fed.us
00-2-31	Restoring mixed conifer ecosystems to pre-fire suppression conditions in Crater Lake National Park	Mark Huff	mhhuff@fs.fed.us
00-2-32	Control of invasive annual grasses in the Mojave Desert	Matt Brooks	matt_brooks@usgs.gov
00-2-33	The Lick Creek Demonstration – forest renewal through partial harvest and fire	Benjamin Zamora	bzamora@mail.wsu.edu
00-2-34	Fuels treatment demonstration sites in the boreal forests of Interior Alaska	Robert Ott	rott@tananachiefs.org
00-2-35	Evaluation of three fuel management treatments for eastern white pine	James Cook	jcook@uwsp.edu
01-3-1-05	Demonstrating the ecological effects of mechanical thinning and prescribed fire on mixed-conifer forests	Malcolm North	mnorth@fs.fed.us
01-3-1-06	Two demonstration sites in northern Arizona for forest thinning, fire use, and fire surrogate treatments in the ponderosa pine type	Edward Smith	ebsmith@flagstaff.az.us
01B-3-1-01	The Flomaton Natural Area: demonstrating the benefits of fuel management and the risks of fire exclusion in an old-growth longleaf pine ecosystem	John Kush	kushjoh@auburn.edu
01B-3-1-03	Dormant-season prescription fires to reduce hazardous fuel loads on the South Carolina Coastal Plain: establishing a demonstration area on a 40+ year study	Dale Wade	rxfire@ix.netcom.com
01B-3-1-04	Long-term dormant-season burning interval study in the Palmetto/Gallberry Fuel Complex: establishing an adjacent growing season burn study and making both demonstration areas	Dale Wade	rxfire@ix.netcom.com
01B-3-1-05	Frequency and season of prescription fires to reduce hazardous fuel loads on the Lower Piedmont of Georgia: establishing a demonstration area on a 12-year-old study	Dale Wade	rxfire@ix.netcom.com
01C-3-1-02	Armells Creek prescribed fire demonstration project	Clayton Marlow	cmarlow@montana.edu
01C-3-1-05	Managing fuels in northeastern barrens	David Crary	David_Crary@nps.gov

Administrative Studies and Local Needs Projects

01-3-2-02	Tree regeneration response to fire restoration in mixed-conifer forest	Andrew Gray	agray01@fs.fed.us
01-3-2-03	Prescribed fires in Mid-Atlantic Coastal Plain forests	Oliver Pattee	hank_pattee@usgs.gov
01-3-2-08	Risk assessment of fuel management practices on hillslope erosion processes (Phase II)	Peter Robichaud	probichaud@fs.fed.us
01-3-2-09	Prescribed fire for fuel reduction in northern mixed grass prairie: influence on habitat and population dynamics of indigenous wildlife	Robert Murphy	bob_murphy@fws.gov
01-3-2-12	Weed invasions following fire in southwestern Colorado: long-term effectiveness of mitigation treatments and future predictions	Lisa Floyd-Hanna	lfloyd-hanna@prescott.edu
01-3-2-14	Effects of prescribed grazing and burning treatments on fire regimes in alien grass-dominated wildland-urban interface areas, Leeward Hawaii	Michael Castillo	Mick_Castillo@fws.gov
01-3-3-12	Identifying reference conditions for prescribed fire management of mixed conifer forests in Yosemite National Park, Californi"	Kara Paintner	kara_paintner@nps.gov
01-3-3-13	Fire and forest structure across vegetation gradients in San Juan National Forest, Colorado: a multi-scaled historical analysis	Peter Brown	pmb@rmtrr.org
01-3-3-14	Fire and oak regeneration in the southern Appalachians	David Loftis	dloftis@fs.fed.us

Project ID No.	Project Title	Lead Scientist	e-mail address
01-3-3-18	Evaluating the effects of prescribed fire and fuels treatment on water quality and aquatic habitat	Caty Clifton	cclifton@fs.fed.us
01-3-3-20	Experimental studies of the role of fire in restoring and maintaining arid grasslands	Carl Edminster	cedminister@fs.fed.us
01-3-3-27	Jeffrey pine-mixed conifer fire history and forest structure with and without fire suppression and harvesting	Carl Skinner	cskinner@fs.fed.us
01-3-3-29	Assessing anthropogenic changes in fire regimes using relict areas in El Malpais National Monument, New Mexico	Henri Grissino-Mayer	grissino@utk.edu
01-3-3-30	Including fire effects information in a manual of California Vegetation	Michael McCoy	mcmccoy@ucdavis.edu
01-3-3-32	Changes in fire regimes and the successional status of Table Mountain pine (*Pinus pungens* Lamb.) in the southern Appalachians	Henri Grissino-Mayer	grissino@utk.edu
01-3-3-33	Predicting the invasion and survival of the exotic species Paulownia tomentosa following burning in pine and oak-pine forests	Michael Jenkins	mike_jenkins@nps.gov
01-3-3-34	Effects of fire on biological soil crusts and their subsequent recovery at the Great Basin Pinyon-Juniper Demonstration Area	Steven Warren	swarren@cemml.colostate.edu
01B-3-2-01	Impacts of prescribed burning on the survival of Douglas-fir and ponderosa pine in the Boise National Forest	Robert Prograr	rprograr@fs.fed.us
01B-3-2-07	Management of fuel loading in the shrub-steppe	Steven Link	slink@tricity.wsu.edu
01B-3-2-08	Pre-fire fuel manipulation impacts on alien plant invasion of wildlands	Jon Keeley	jon_keeley@usgs.gov
01B-3-2-10	Determining the ecological effects of fire suppression, fuels treatment, and wildfire through bird monitoring in the Klamath Ecoregion of southern Oregon and northern California	John Alexander	jda@klamathbird.org
01B-3-2-11	Using cattle as fuel reduction and seeding agents in annual and perennial grass stands in the Great Basin	Christopher Call	cacall@cc.usu.edu
01B-3-3-01	Effects of fire and rehabilitation seeding on sage grouse habitat in the pinyon-juniper zone	Jeanne Chambers	jchambers@fs.fed.us
01B-3-3-03	Effects of prescibed fire on the invasion of northern mixed -grass prairie by non-native plant species: implications for restoration of an endangered ecosystem	Fred Giese	fred_giese@fws.gov
01B-3-3-06	Interactions of burn season and ecological condition on ecosystem response to fire in the mountain big sagebrush communities: information necessary for restoration and postfire rehabilitation	Boone Kauffman	boone.kauffman@orst.edu
01B-3-3-13	Quantification of fuel in Baccharis (coyote bush) shrub types: assessing fuel loading using destructive and non-destructive methods	Will Russell	wrussell@usgs.gov
01B-3-3-15	Integrating prescribed fire into management of mixed-oak forests of the Mid-Atlantic Region: developing basic fire behavior and fuels information for the Silvah System	Patrick Brose	pbrose@fs.fed.us
01B-3-3-16	Effects of season and interval of prescribed burns in a ponderosa pine ecosystem	Walter Thies	wthies@fs.fed.us
01B-3-3-24	Development of a methodology for building long-term fire history in Great Basin Valley landscapes	Pat Barker	Pat_Barker@nv.blm.gov
01B-3-3-26	Fire knowledge for managing Cascadian whitebark pine forests	Michael Murray	michael.murray@orst.edu
01B-3-3-27	Fuels management and non-native plant species: an evaluation of fire and fire surrogate treatments in Chaparral Plant Community	Tim Bradley	tim_bradley@nps.gov
01B-3-3-28	Fire effects on rare flora and fauna in southern California national forests	Jan Beyers	jbeyers@fs.fed.us
01C-3-3-01	An integrated assessment of the historical role and contemporary uses of prescribed fire in southern Appalachian ecosystems	James Vose	jvose@fs.fed.us
01C-3-3-02	Implications of fire and fire surrogate treatments on fisher habitat in the Sierra Nevada	Richard Truex	rtruex@fs.fed.us
01C-3-3-09	Fire regimes and successional dynamics of yellow pine stands in the central Appalachian Mountains	Henri Grissino-Mayer Elaine Sutherland	grissino@utk.edu
01C-3-3-13	Effectiveness of alien and native seed mixes in reducing cheatgrass growth and reproduction	Matt Brooks	matt_brooks@usgs.gov

Joint Fire Science Program Project Deliverables

JFSP Project No.	Project Title and Web Link *	Lead Scientist	e-mail address
98-S-01	Rainbow Series (two of five volumes finished: 1) effects of fire on flora and 2) effects of fire on fauna) http://www.fs.fed.us/rm/pubs/rmrs_gtr42_2.html (flora) http://www.fs.fed.us/rm/pubs/rmrs_gtr42_1.html (fauna)	Kevin Ryan, RMS	kryan@fs.fed.us
98-S-2	Coarse-scale spatial data for wildland fire and fuels management http://www.fs.fed.us/fire/fuelman/	Colin Hardy, RMS	chardy@fs.fed.us
98-S-3	Ecological and economic consequences of the 1998 Florida wildfires http://flame.fl-dof.com/joint_fire_sciences/	Sue Grace, FWS	sue_grace@fws.gov
98-S-4	Study of Florida residents regarding three alternative fuel treatment programs http://www.nifc.gov/joint_fire_sci/floridafinal.pdf	Armando Gonzalez-Caban, PSW	agonzalezcaban @fs.fed.us
98-1-1-07	Joint fire conference and workshop http://www.nifc.gov/joint_fire_sci/conferenceproc/index.htm	Gregg Gollberg, Univ. of Idaho	goll9151@uidaho.edu
98-1-4-02	Assessing values at risk in the U.S. from wildland fire http://www.vardss.info/	Douglas Rideout, Colorado State University	doug@cnr.colostate.edu
98-1-4-09	Stand replacement prescribed burning for fuel reduction and regeneration of Table Mountain/pitch pine stands in the southern Appalachian mountains *	Tom Waldrop, SRS, Clemson	twaldrop@fs.fed.us
98-1-4-14	Ventilation Climate Information System (Assessing values of air quality and visibility at risk from wildland fires) http://www.fs.fed.us/pnw/fera/vent/	Sue Ferguson, PNW	sferguson@fs.fed.us
98-1-5-01	Fire regimes and fuel treatments: a synthesis with manager feedback *	Philip Omi, Colorado State University	phil@cnr.colostate.edu
98-1-7-02	Adaption of Fuels and Fire Extension to the Forest Vegetation Simulator http://forest.moscowfsl.wsu.edu/4155/ffe-fvs.html	Nick Crookston, RMS	ncrookston@fs.fed.us
98-1-8-02	BehavePlus Fire Modeling System Version 1.0.0 http://fire.org/cgi-bin/nav.cgi?pages=behave&mode=22	Pat Andrews, RMS	pandrews@fs.fed.us
98-1-7-04	Development of a flexible, standardized methodology for optimizing fuel treatment programs across space and time *	Denis Dean, Colorado State University	denis@cnr.colostate.edu
98-1-8-03	A National First Order Fire Effects Model (FOFEM) http://www.fire.org/cgi-bin/nav.cgi?pages=fofem&mode=1	Elizabeth Reinhardt, RMS	ereinhardt@fs.fed.us
98-1-8-01	Development, sensitivity testing, and retrospective application of the Fire Effects Tradeoff Model (FETM) *	Jim Russell, PNW	jrussell01@fs.fed.us
98-1-9-03	Technically Advanced Smoke Estimation Tools (TASET) http://www.fs.fed.us/rm/pubs/rmrs_gtr42_1.html	Douglas Fox, Colorado State University	dfox@cira.colostate.edu
99-1-1-01	Assessing the need, costs, and potential benefits of prescribed fire and mechanical treatments to reduce fire hazard in New Mexico and Montana http://www.nifc.gov/joint_fire_sci/ummontanarpt.pdf http://www.nifc.gov/joint_fire_sci/NMreport.pdf	Jamie Barbour, PNW	jbarbour@fs.fed.us
99-1-3-11	Mixed-severity fire regime in a high-elevation forest: Grand Canyon, AZ *	Pete Fule, Northern Arizona University	Pete.Fule@nau.edu
99-1-3-28	Spatial and temporal analysis of lightning and fire occurrence in Rocky Mountain wilderness areas *	Matt Rollins, RMS	mrollins@fs.fed.us
99-1-4-01	Effect of fuel treatments on wildfire severity http://www.cnr.colostate.edu/FS/westfire/FinalReport.pdf	Philip Omi, Colorado State University	phil@cnr.colostate.edu
01-S-02	Symposium: Fire and Forest Meteorology *	Sue Ferguson, PNW	sferguson@fs.fed.us
01-S-05	Proceedings of the Invasive Species Workshop: the role of fire in the control and spread of invasive species http://www.nifc.gov/joint_fire_sci/invasive%20publications/invasiveproceedings.htm	Tyrone Wilson, USGS	Tyrone_Wilson@usgs.gov
01-3-3-32	Changes in fire regimes and the successional status of Table Mountain pine (*Pinus pungens* Lamb.) in the southern Appalachians *	Henri Grissino-Mayer, Univ. of Tennessee	grissino@utk.edu

* Deliverable not currently provided on the Web. Please contact lead scientist for information.

Selected Publications Related to JFSP-Funded Projects

Allen, Craig; Savage, Melissa; and 8 others. (In press). Ecological restoration of southwestern ponderosa pine ecosystems: A broad perspective. Ecological Applications.

Brady, Juli A.; Robichaud, Peter R.; Pierson, Fredrick B. ,Jr. 2001. Infiltration rates after wildfire in the Bitterroot Valley. Society for Engineering. In: Agriculture, Food, and Biology System Paper 01-8003. 11 p. (Presented at 2001 ASAE Annual International Meeting, Sacramento Convention Center, Sacramento, CA, July 30-August 1, 2001.)

Breininger, D.L. 1999. Florida scrub-jay demography and dispersal in a fragmented landscape. Auk. 116: 520-527.

Breininger, D.R.; Burgman, M.A.; Stith, B.M. 1999. Influence of habitat, catastrophes, and population size on extinction risk on Florida scrub-jay populations. Wildlife Society Bulletin. 27: 810-822.

Brooks, Matthew L.; Catchett, John R. 2001. Plant community patterns in unburned and burned blackbrush (*Coleogyne ramosissima*) shrublands in the Mojave Desert. Report prepared for National Park Service, Oakland, CA. 17 p.

Brose, P.H.; Wade, D. (In press.) Potential fire behavior in pine flatwood forests following three different fuel reduction techniques. Forest Ecology and Management.

Brose, Patrick; Wade, Dale. 2001. Understory herbicide as a treatment for reducing hazardous fuels and extreme fire behavior in slash pine plantations. In: Outcalt, Kenneth, ed. Proceedings 11th Biennial Southern Silviculture Research Conference; 2001 March 20-22; Knoxville, TN. Gen. Tech. Rep. SRS-48. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 109-113.

Brose, Patrick; Tainter, Frank; Waldrop, Thomas. 2001. Regeneration history of three Table Mountain pine/pitch pine stands in northern Georgia. In: Outcalt, Kenneth, ed. Proceedings 11th Biennial Southern Silviculture Research Conference; 2001 March 20-22; Knoxville, TN. Gen. Tech. Rep. SRS-48. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station:
296-301.

Brose, Patrick H.; Tainter, Frank; Waldrop, Thomas A. 2001. Regeneration history of Table Mountain/pitch pine stands in two locations in the southern Appalachians. In: Outcalt, Kenneth, ed. Proceedings 11th Biennial Southern Silviculture Research Conference; 2001 March 20-22; Knoxville, TN. Gen. Tech. Rep. SRS-48. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station

Butry, D.T.; Mercer, D.E.; Prestemon, J.P.; Pye, J.M.; Holmes, T.P. 2001. What is the price of catastrophic wildfire? Journal of Forestry. 99(11): 9-17.

Edminster, C.B.; Weatherspoon, C.P.; Neary, D.G. 2000. The fire and fire surrogates study: Providing guidelines for fire in future watershed management decisions. P. 312-315. Land stewardship in the 21st century: the contributions of watershed management; 2000 March 13-15; Tucson, AZ. Proc. RMRS-P-13. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station:
312-315

Elliot, W.J.; Robichaud, P.R.; Pannkuk, C.D. 2001. A probabilistic approach to modeling erosion for spatially varied conditions. In: Proceedings, 7th Federal Interagency Sedimentation Conference; 2001 March 25-29; Reno, NV: VI-33-VI-40.

Ferguson, S.A. 2000. Climatology of biomass smoke in wildland areas of the United States. In: Third Symposium, Fire and Forest Meteorology; January 9-14; Long Beach, CA: 43-48.

Ferguson, Sue A.; Sandberg, David V.; Ottmar, Roger. 2000. Modeling the effects of land use changes on global biomass emissions. In: Innes, John; Beniston, Martin; Verstraete, Michel, eds. Biomass burning and its inter-relationships with the climate system. Dordrecht, The Netherlands: Kluwer Academic Publishing:
33-50.

Grace, Sue; Wade, Dale. 2001. Ecological and economic consequences of the 1998 Florida wildfires. In: Proceedings, 3rd Longleaf Alliance Conference; October 16-18; Alexandria, LA: 70-74.

Hanula, J.L.; Meeker, J.R.; Miller, D.R.; Barnard, E.L. (In press.) Association of wildfire with tree health and numbers of pine bark beetles and their associates in Florida. Forest Ecology and Management.

Hof, J.; Omi, P.N.; Bevers, M.; Laven, R.D. 2000. A timing oriented approach to spatial allocation of fire management effort. Forest Science. 46: 442-451.

Loomis, John B.; Bair, Lucas S.; Gonzales-Caban, Armando. 2001. Prescribed fire and public support: Knowledge gained, attitudes changed in Florida. Journal of Forestry. 99 (11): 18-22.

Ottmar, Roger D.; Vihnanek, Robert E.. 2000. Stereo photo series for quantifying natural fuels. Vol. VI: Longleaf pine, pocosin, and marshgrass in the Southeast United States. PMS 835. Boise, ID. National Wildfire Coordination Group. 85p.

Ottmar, Roger D.; Vihnanek, Robert E.; Regelbrugge, Jon C. 2000. Stereo photo series for quantifying natural fuels. Vol. IV: Pinyon-juniper, sagebrush, and chaparral types in the Southwestern United States. PMS 833. Boise, ID. National Wildfire Coordination Group. 97 p.

Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clint S. 1998. Stereo photo series for quantifying natural fuels. Vol. I: Mixed-conifer with mortality, western juniper, sagebrush, and grassland types in the Interior Pacific Northwest. PMS 830, NFES 2580. Boise, ID. National Wildfire Coordination Group..73 p.

Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clinton S. 2000. Stereo photo series for quantifying natural fuels. Vol. III: Lodgepole pine, quaking aspen, and Gambel oak types in the Rocky Mountains. PMS 832. Boise, ID. National Wildfire Coordination Group. 85p.

Outcalt, K.W.; Wade, D. 2000. The value of fuel management in reducing wildfire damage. In: Proceedings, JFSP Conference on Crossing the millennium: integrating spatial technologies and ecological principles for a new age in fire management; 1999 June 15-17; Boise, ID: University of Idaho and IAWF: 271-274.

Pierson, Frederick B.; Robichaud, Peter R.; Spaeth, Kenneth E. 2001. Spatial and temporal effects of wildfire on the hydrology of a steep rangeland watershed. Hydrology Process. 15:
2905-2916.

Prestemon, J.P.; Pye, J.M.; Butry, D.T.; Holmes, T.P.; Mercer, D.E. (In press.) Understanding broad scale wildfire risks in human-dominated landscapes. Forest Science.

Rorig, Miriam L.; Ferguson, Sue A. 1999. Characteristics of lightning and wildland fire ignition in the Pacific Northwest. Northwest Journal of Applied Meteorology. 38 (11): 1565-1575.

Sandberg, David V.; Ottmar, Roger D.; Cushon, Geoffrey H. 2001. Characterizing fuels in the 21st century. International Journal of Wildland Fire. 10: 381-387.

Welch, Nicole Turrill; Waldrop, Thomas A. 2001. Restoring Table Mountain pine (Pinus pungens Lamb.) communities with prescribed fire: An overview of current research. Castanea. 66
(1-2): 42-49.

Welch, N.T.; Waldrop, T.A.; Buckner, E.R. 2002. Response of southern Appalachian Table Mountain pine (Pinus pungens) and pitch pine (P. rigida) stands to prescribed burning. Forest Ecology and Management.
136: 185-197.

Winter, Gregory J.; Vogt, Christine; Fried, Jeremy S. 2002. Fuel treatments at the Wildland-Urban Interface: Common concerns in diverse regions. Journal of Forestry. 100(1): 15-21.

Wohlgemuth, Peter M.; Hubbert, Ken R.; Robichaud, Peter R. 2001. The effects of log erosion barriers on post-fire hydrologic response and sediment yield in small forested watersheds, southern California. Hydrology Process.
15: 3053-3066.